Figure 3-39. Eastern view of 1982 excavation north of building CPP-604 showing extent of excavation through the CPP-20 and CPP-25 release sites.

No sampling and analysis of the contaminated backfill, reportedly present between 18 and 28 ft below grade, have been performed. Because of the lack of confirmatory samples, concentrations of radionuclides in the backfill were conservatively assumed to be similar to concentrations in soil previously excavated from areas within the tank farm as a part of the 1993 to 1995 HLWTFU project. In June 1995, 11 samples were collected from this contaminated soil to characterize concentrations of radionuclides. The results of these analyses are summarized in Table 3-12 (DOE-ID 1997a). The radionuclides at the highest activities, Sr-90 and Cs-137, were detected at 330 ± 3 and 114 ± 1 pCi/g, respectively. Other detected radionuclides had maximum activities no greater than 2.2 pCi/g (WINCO 1993a).

Table 3-12. Analytical results summary table for contaminated soil excavated during HLWTFU project.

Radionuclide[a]	Concentration Minimum (pCi/g)	Concentration Maximum (pCi/g)	Arithmetic Mean (pCi/g)	Number of Samples	Number of Detections	INEEL Background (pCi/g)
Gross alpha	5.2 ± 1.7	12 ± 2	7.35	11	11	NA
Gross beta	36 ± 3	689 ± 3	161.6	11	11	NA
Am-241	0.06 ± 0.03	0.17 ± 0.04	0.115	11	2	0.011
Co-60	0.09 ± 0.02	0.09 ± 0.02	0.09	11	1	NA
Cs-134	0.13 ± 0.03	0.19 ± 0.03	0.16	11	2	NA
Cs-137	3.81 ± 0.08	114 ± 1.0	34.0	11	11	0.82
Eu-154	0.48 ± 0.1	0.48 ± 0.1	0.48	11	1	NA
Np-237	0.1 ± 0.04(J)	0.17 ± 0.04(J)	0.127	11	7	NA
Pu-238	0.11 ± 0.03(J)	0.43 ± 0.05(J)	0.22	11	9	0.0049
Pu-239/240	0.05 ± 0.02	0.09 ± 0.02	0.07	11	2	0.10
Sr-90	6.6 ± 0.3	330 ± 3.0(J)	58.9	11	11	0.49
Tc-99	0.9 ± 0.4	2.2 ± 0.5	1.46	11	11	NA
U-234	0.5 ± 0.1	1 ± 0.1	0.78	11	11	1.44
U-238	0.5 ± 0.1	1 ± 0.1(J)	0.83	11	11	1.40

NA – Not available.

J – Indicates the value reported is an estimate.

a. Radionuclides analyzed for but not detected: Ce-144, Co-58, Eu-155, Nb-95, Ru-103, Ru-106, Sb-125, U-235.

Site CPP-20 was originally included in OU 3-07, which underwent a Track 2 investigation in 1992 (WINCO 1993a). On the basis of the information indicating contaminated soil had been removed from the site during the 1982 Fuel Processing Facility Upgrade Project, the site was recommended for No Further Action, contingent on an evaluation of the contaminated backfill as part of the OU 3-13 BRA (DOE-ID 1997a). As part of the OU 3-13 BRA, the site was evaluated using analytical results obtained from the HLWTFU project for excavated soils.

To conservatively bound the amount of residual Cs-137 and Sr-90 contamination that may be present at this site, the volume of soil was calculated to be 5,754 ft^3 using the size of the CPP-20 release site (15 ft × 13.7 ft) and a depth of 28 ft (the depth from the top of the berm to the top of the tank vault). Using a soil mass of 125 lb/ft^3 (56,750 g/ ft^3) and Cs-137 and Sr-90 concentrations of 114 and 330 pCi/g, respectively, residual contamination was calculated to be 0.145 total curies (0.037 Ci Cs-137 and 0.10 Ci Sr-90).

3.1.10 Site CPP-25

Site CPP-25 is located in the same general area as CPP-20 and overlaps the CPP-20 site on the eastern edge (Figure 3-1). CPP-25 is the location of a ruptured transfer line that was being used to transfer liquid waste from tank WC-119 to the PEW evaporator feed tank (WL-102). The rupture resulted in a release of an unknown quantity of liquid waste adjacent to the north side of building CPP-604 in August 1960. At the time of the incident, radiation readings in the contaminated soil reportedly ranged

from 2 to 4 R/hr. Approximately 9 yd^3 of soil were removed after the spill, and the side of the building was washed to remove contamination. No records exist to verify the effectiveness of these cleanup activities.

As described for CPP-20, the area where CPP-25 is located was entirely excavated during the 1982 phase of the Fuel Processing Facility Upgrade Project and partially during the 1983 to 1984 phase. The excavations were reportedly filled with clean fill in the upper 30 ft and with soil that had radiation levels of 3 to 5 mR/hr from 30 to 40 ft. Site CPP-25 underwent a Track 2 investigation in 1992 (WINCO 1993a). On the basis of the information indicating contaminated soil had been removed from the site during the Fuel Processing Facility Upgrade Project, the site was recommended for No Further Action, contingent on an evaluation of the contaminated backfill as part of the OU 3-13 RI/FS.

No sampling and analysis of the contaminated backfill, reportedly present between 18 and 28 ft below grade, have been performed. Because of the lack of confirmatory samples, concentrations of radionuclides in the backfill were conservatively assumed to be similar to concentrations in soil previously excavated from areas within the tank farm as a part of the 1993 to 1995 HLWTFU project. In June 1995, 11 samples were collected from this contaminated soil to characterize concentrations of radionuclides. The results of these analyses are summarized in Table 3-12 (DOE-ID 1997a). The radionuclides detected at the highest activities, Sr-90 and Cs-137, were analyzed at 330 ± 3 and 114 ± 1 pCi/g, respectively. Other detected radionuclides had maximum activities no greater than 2.2 pCi/g (WINCO 1993a).

To conservatively bound the amount of residual Cs-137 and Sr-90 contamination that may be present at CPP-25, the volume of soil was calculated to be 9,800 ft^3 using the size of the CPP-25 release site (50 ft × 10 ft) and a depth of 28 ft (the depth from the top of the berm to the top of the tank vault). The overlap volume (150 ft^2 × 28 ft deep) of CPP-20 was subtracted from the CPP-25 volume. Using a soil mass of 125 lb/ft^3 (56,750 g/ft^3) and Cs-137 and Sr-90 concentrations of 114 and 330 pCi/gm, respectively, residual contamination was calculated to be 0.247 total curies (0.063 Ci Cs-137 and 0.184 Ci Sr-90).

3.1.11 Site CPP-58

Site CPP-58, located near buildings CPP-605 and CPP-604, includes an area south of the tank farm contaminated with PEW condensates that were being transferred to the service waste system (Figure 3-40). The PEW was used to concentrate dilute low- and intermediate-level radioactive liquid wastes. The concentrated bottoms solution from the PEW was sent to the tank farm as incidental liquid waste and the condensate was sent to the service waste system. Additional investigations have been conducted as a part of this Work Plan to better understand the release mechanisms and locations of the releases.

As part of the OU 3-14 DQO process, an investigation was performed to identify the locations of piping runs installed to transfer the PEW condensates from the evaporator to the service waste system. Further analysis and review of piping diagrams determined that the 1954 release (denoted as site CPP-58W) did not take place under building CPP-649 as originally shown on figures in the Track 2 and OU 3-13 documents. This release actually occurred to the northwest of the CPP-58 site boundary, between buildings CPP-601 and CPP-604. Both the OU 3-13 ROD and the Track 2 Summary Report for Operable Unit 3-11 incorrectly defined the release that occurred in the area identified as CPP-58W as the 1954 release. A review of historical piping diagrams determined that the release in 1954 occurred during construction of new storage tank piping runs northwest of CPP-604. Between 1953 and the mid-1960s, the PEW condensates were combined with other cold waste streams (PEW cooling water and steam condensate) that were pumped through an 8-in.-diameter cement pipe that exited the north side of

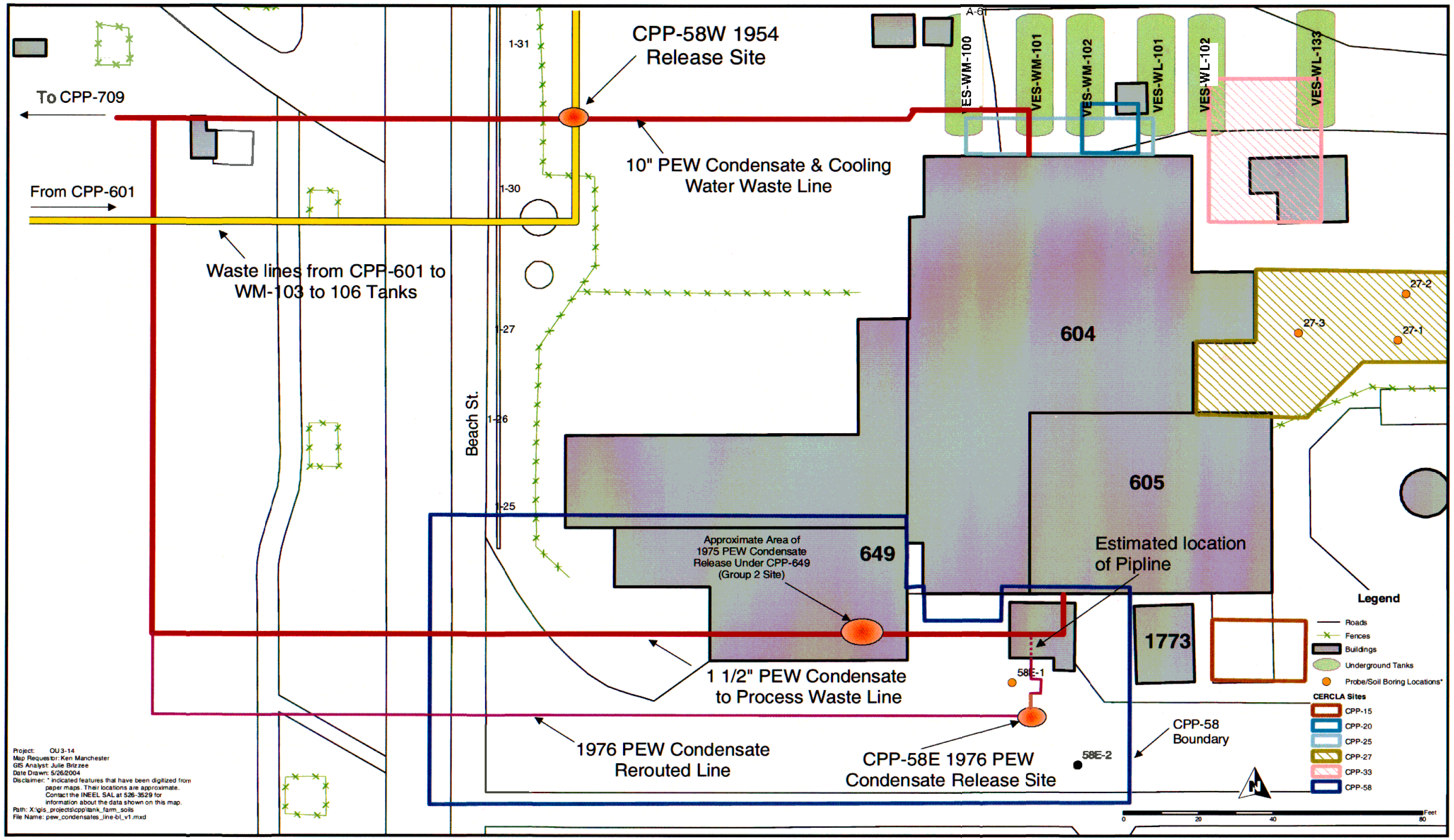

Figure 3-40. Map showing location of release site CPP-58, piping, and leak locations.

CPP-604 and ran west to the CPP-751 monitoring station, which is located just east of building CPP-601. During construction of waste lines from CPP-601 to the WM-103, -104, -105, and -106 tanks, the 8-in.-diameter cement pipe was crossed and believed to have been damaged during the construction activities. This release was reported, but no estimate was given on quantities of the release.

During the 1964 timeframe, the PEW condensates were redirected from the 8-in.-diameter cement pipe and were pumped through a 1.5-in.-diameter stainless steel line that exited the south side of building CPP-605 and then west beneath CPP-649. In 1976, the PEW condensate line was rerouted to the south. Two PEW condensate releases are associated with these PEW lines. One release occurred in 1976 and is referred to as CPP-58E. During the OU 3-14 Work Plan development, a release that occurred in 1975 under building CPP-649 was discovered that was previously erroneously identified in OU 3-13 figures as the location of the 1954 release (site CPP-58W). This 1975 release has not been presented in previous CERCLA documents. In OU 3-13, Group 2 sites CPP-87/89 appear to be from the same source and in the same area (under the adjacent buildings CPP-604/605, which are attached to building CPP-649). On the basis of this new information, Group 2 site CPP-87/89 appears to be more extensive than previously identified. A groundwater source term for this OU 3-13 Group 2 site will be included in the INTEC groundwater model for OU 3-14. When CPP-649 and the adjoining buildings CPP-604/605 are removed, the soil beneath the buildings will be assessed and appropriate follow-on activities performed per the OU 3-13 ROD in accordance with the remedial action objectives for the Group 2 sites.

During the 2001 Group 1 TFIA field activities, two new areas of contamination were discovered along Olive Avenue. First, a moist brown material (nitric acid contamination) was uncovered while excavating a trench for the TFIA drainage system along Olive Avenue. Second, elevated levels of radiological contamination were discovered in soil while excavating the TFIA drainage system lift station near the intersection of Olive Avenue and Beech Street. The Agencies extended the boundary of CPP-58 to include these two contaminated areas.

The following text provides additional detail on the CPP-58W 1954 PEW release, CPP-58E, and the CPP-58 new site information (nitric acid spill) to document what is known about CPP-58. The 1975 release discovered under building CPP-649 that is part of Group 2 sites CPP-87/89 is also discussed in order to determine the additional source term for the groundwater modeling because it has not previously been included in the INTEC model.

3.1.11.1 CPP-58W (1954 PEW Release). The PEW release from the 8-in.-diameter cement pipeline occurred between August 30 and September 1, 1954, during construction activities. The leakage was occurring from joints in the cement pipe that was buried approximately 6 to 8 ft bgs. On the basis of available information, the cement pipe appears to have been damaged during the construction of a waste-piping run that crossed under the 8-in.-diameter cement line. According to a September 1, 1954, occurrence report, radiological readings on the pipe at the release were 25 mR/hr and water in the ditch had a slight amount of contamination, based on field readings (Savignac 1954). No readings from the water were included in the report. The pipe was repaired by replacing approximately 30 ft of the cement pipe with schedule 40 carbon steel pipe (Lyon 1954).

No estimate of the amount of leakage or radioactivity was provided in either the weekly or the occurrence reports. To bound the release, the entire contents of the gravity-fed pipe upstream of the cracked joint are assumed to have been released and the pipe is assumed to have been totally full. In reality, the gravity-fed line would not have been full and the entire contents of the pipe likely did not leak because some of the waste would continue to drain past the leaking joint. The PEW feed to this line could have been shut off immediately through a switch and a reasonable assumption is that this was done to protect the construction workers who were excavating in this area because the PEW condensate was the

source of radioactivity to the pipe. Shutting off all the service wastewater lines immediately would not have been possible, and service wastewater continued to leak for at least a day.

The distance is approximately 140 ft from building CPP-604 to the damaged section of the 8-in.-diameter pipe, resulting in a maximum of 370 gal of liquid possibly contained in the pipe. Using 125,000 gal as an average volume of PEW condensates generated per month at the time of release and a total activity of 0.495 curies based on the ICPP Monthly Progress Report for the month of August 1954, the activity in the PEW condensate is estimated at 4.0×10^{-6} curies. On the basis of the analytical results from the monthly report, approximately 9% of the activity was attributed to Sr-90, or 3.6×10^{-7} Ci/gal. Doubling the amount to 7.2×10^{-7} Ci/gal. would approximate the combined Cs-137 and Sr-90 activities in PEW condensates. Taking into consideration that the PEW contributed approximately 10% of the liquid waste stream passing through the 8-in.-diameter pipe, approximately 37 gal of the assumed release would have been PEW condensates. Multiplying the 37 gal by the Cs-137 and Sr-90 activity per gallon results in 26.6 μCi of Cs-137 and Sr-90 released. The appropriate radionuclide ratios with respect to Cs-137 for PEW condensates can be applied to the more mobile radionuclide fractions to determine a source term.

3.1.11.2 CPP-58E Leak Description and Extent of Contamination. Site CPP-58E has contamination resulting from a September 1976 subsurface release of PEW evaporator condensate. An estimated 20,000 gal of condensate were released due to failure of a transfer line between the PEW evaporator and the service waste diversion system in building CPP-751. The release occurred at a point in the transfer pipe where it makes a 90-degree turn and the diameter of the line narrows from 3 to 2 in. (Allied Chemical Corporation 1976). The line is buried 6 ft bgs. An estimated 51 mCi of H-3, 2 mCi of Sr-90, 4 mCi of Ru-106, 2 mCi of Cs-137, and 1 mCi of Ce-144 were released. Though the damaged line was repaired, the contaminated soil was reportedly left in place and covered with clean soil.

As part of the 1992 Track 2 investigation for OU 3-11 (WINCO 1993d), two boreholes were made at the CPP-58E site (see Figure 3-40). The locations of the boreholes were selected so that underground utilities would not be damaged. One borehole was drilled to 12 ft bgs and was located approximately 30 ft southwest of the release. The other borehole was drilled to 46 ft bgs and was located within 12 ft of the release site. Plans called for samples to be collected from intervals exhibiting the highest gamma/beta radiation fields as measured with field instruments. However, no radiation above background was detected in either borehole; therefore, samples that were representative of the entire drilled intervals were collected. Thirteen samples were collected from the two boreholes and analyzed for VOCs, selected metals (mercury and cadmium), fluoride, nitrate, nitrite, pH, and radionuclides.

Sampling and analysis showed gross alpha activity ranged from 3.92 ± 0.67 to 24.4 ± 3.28 pCi/g. Only the sample collected from 8 to 10 ft in borehole CPP-58E-1 exceeded the background activity of 20 pCi/g. Subsequent isotopic analyses for alpha-emitting radionuclides on this sample detected U-234 and -238 below background concentrations and Pu-238, U-235, Pu-239, and Am-241 above background concentrations.

Sampling and analysis results indicated that Cs-137 and Sr-90 were above background levels. The gross beta activity ranged from 31.3 ± 2.78 to 271 ± 22.1 pCi/g. Subsequent isotopic analysis for Sr-90 detected concentrations ranging from 0.877 ± 0.276 to 33.4 ± 3.17 pCi/g. In general, lower concentrations of Sr-90 were measured in borehole CPP-58E-2 than in CPP-58E-1. This is expected because borehole CPP-58E-1 is closer to the location of the release. The results of the gamma analysis detected only Cs-137 and K-40. The concentrations of K-40 are within normal background ranges. Cs-137 activities ranged from 0.269 ± 0.0211 to 63.1 ± 4.57 pCi/g, with the higher concentrations detected at a depth of less than 22 ft in borehole CPP-58E-1 and at depths less than 10 ft in borehole CPP-58E-2.

Below 6 ft bgs, the primary contaminants detected were Cs-137 and Sr-90. This is consistent with the waste stream that was reportedly released. Cs-137 concentrations are generally higher than Sr-90 concentrations above 22 ft in borehole CPP-58E-1 and above 12 ft in borehole CPP-58E-2. Below these depths, Sr-90 concentrations are higher than Cs-137 concentrations. This relationship is believed to be the result of the greater mobility of Sr-90 relative to Cs-137, given that these two radionuclides were likely in roughly equal concentrations in the released condensate.

Process knowledge can be applied to this release to determine a source term. For the month of September, 193,400 gal of PEW condensates were transferred to the service waste system. To bound the amount of Cs-137 and Sr-90 released by the CPP-58E leak, Cs-137 and Sr-90 concentrations based on analytical data for the September 1976 PEW condensates were used. The Cs-137 and Sr-90 monthly discharge for September 1976 was 20 mCi and 7.1 mCi, respectively. Converting to curies per gallon results in 1.03×10^{-7} curies Cs-137/gal and 3.67×10^{-8} curies Sr-90/gal. Multiplying these values by the assumed release volume yields a Cs-137 and Sr-90 release of 2.8 mCi. The PEW analyses for September 1976 also had a monthly total of I-129. The 193,400 gal of PEW contained 1.24 mCi of I-129. On the basis of these numbers, the average concentration in the PEW condensate would have been 6.41×10^{-9} Ci/gal. Multiplying this concentration by the estimated volume leaked results in an estimated 0.13 mCi of I-129 released.

3.1.11.3 CPP-58 New Site Information. In April 2001, during Group 1 TFIA field activities, a moist brown material (nitric acid contamination) was uncovered while excavating a trench for the TFIA drainage system along Olive Avenue, and slightly elevated levels of radiological contamination were discovered in soil while excavating a TFIA drainage system lift station near the intersection of Olive Avenue and Beech Street (DOE-ID 2002c).

The area where the moist brown material was discovered is within the area previously identified as CPP-58E and is not likely related to the 1976 release (CPP-58E). The material was slowly seeping into the north wall of the trench as it was being excavated. The top of the seepage/stained area was approximately 6 ft bgs on the north trench wall and extended to the bottom of the trench at that time, a depth of approximately 7 ft. The seepage did not emit radiological activity.

Preliminary sampling and characterization identified the material as nitric acid, which exhibited a low pH (2.41) and the presence of nitrates (3.67 mg/mL). Other contaminants included 0.639 mg/kg of mercury and 6.98 pCi/g of Cs-137.

An attempt was made in 2001 to trace this "seep" back to a source (due to concerns that it could be an ongoing release from an active system) by excavating the moist soil areas. However, the moist discolored soil was in a small, localized area (approximately 1.5 ft in diameter). After removal of the moist soil, a much larger area was excavated and pipes exposed in an attempt to identify any leaking pipes or the source of the release. No leaking pipes or sources were found. The extent of the area excavated is bounded by the utility tunnels on the south and east, by the building/utilities on the north, and the long trench excavation on the west (part of the TFIA) (see drawing in INEEL 2002). In review of the excavation and drawing, the source of the contamination was not evident, because no active nitric acid lines or known abandoned lines were in the immediate area. In addition, an assessment identified no other release from the active systems in the area that might contribute to this release of nitric acid. To provide an indication of contamination remaining in the excavation after completion of the attempt to trace the "seep," composite samples of the dry soils were taken and tested for pH. The results ranged from pH of 1.9 to 8.7. No evidence of any further seepage was observed in the excavated area.

While excavating the lift station near the intersection of Olive Avenue and Beech Street, radiological contamination activities were typically between 200 and 300 cpm with a high of 500 cpm.

The area of this excavation is to the south and west of CPP-58W. The highest project-measured level of contamination was 5,000 decays per minute, based on the 10% efficiency of the field meters. This correlates to 500 cpm. By assuming Cs-137 is the main source of radiation, the dose would be about 0.14 mR/hr and equate to an activity of roughly 22.8 pCi/g Cs-137 in the soil. Because the extent of contamination at CPP-58 is unknown and because of the discovered moist brown-stained soil (discussed above), the boundary of CPP-58 has been revised to include the area of CPP-58E and the area in the proximity to the lift station.

3.1.11.4 1975 Leak Description and Source Term (Group 2). On October 21, 1975, during a routine facility inspection, water was discovered leaking from an electrical conduit going from the Atmospheric Protection System (APS) ventilation air building to the APS off-gas building in CPP-649 (Allied Chemical 1975b). Initially, the leakage was attributed to precipitation in the form of snow and rain on the same day. On October 27, 1975, a large volume of water was discovered on the floor of the CPP-649 ventilation air filter area. Again, due to heavy precipitation on the 2 days prior to the discovery, the leak was blamed on the precipitation. Health physics personnel surveyed the area but reported no contamination.

Inspections conducted on November 1 and 2, 1975, found water again leaking from the conduit on three separate occasions, the source of which was unknown. No precipitation had occurred for a few days prior to the leakage. Samples of the water indicated that it was thermally hot, but contamination was very low, if present at all. Upon further inspection on November 3, concrete was observed to be corroding. The inspectors began suspecting the 1.5-in.-diameter PEW condensate line that ran beneath the southern part of CPP-649 was not intact. Upon investigation, this line was found to have been damaged during excavation activities for construction of the building. The damaged portion of the pipeline was removed and a new piece welded in its place.

As a test, fluorescein dye was added to raw water and pumped through the PEW condensate line on November 4, 1975. Leakage in CPP-649 started within a few minutes after the pumps were turned on, and fluorescein-dyed water appeared almost immediately, proving that the condensate line under CPP-649 had failed. A number of hypotheses were offered as to why the line failed, including improper repairs (welding rod or piping), thermal expansion and contraction forces caused by heating and cooling the line, and building settling.

Waste processing personnel determined that the easiest way to mitigate the problem was to reroute the line south of CPP-649, bypassing the failed portion of the line. A 3-in.-diameter abandoned stainless steel line was identified in the area and pressure-tested to confirm its integrity. The PEW condensate line was rerouted through the 3-in. line and reconnected to the original 1.5-in.-diameter PEW line on the west side of CPP-649.

No volume release estimates of PEW condensates were provided in the occurrence report for the CPP-58W release. Monthly operations records for October and November 1975 indicate that 377,900 gal of PEW condensate were sent to the service waste system for disposal down the injection well. This equals approximately 6,300 gal per day. Assuming that the leakage occurred over a period of 14 days, a total of 88,200 gal passed through the transfer line. A conservative assumption is that 20% of the condensate leaked through the pipe defect. This equates to approximately 17,650 gal. To determine an upper bound for the amount of Cs-137 and Sr-90 released by the leak, Cs-137 and Sr-90 concentrations based on analytical data for the October and November 1975 PEW condensates were used. The Cs-137 contents for October and November were 41 and 22 mCi, respectively. The Sr-90 contents for October and November were 30 and 22 mCi, respectively. Converting to curies per gallon results in 1.55×10^{-7} curies Cs-137/gal and 1.30×10^{-7} curies Sr-90/gal. Multiplying these values by the assumed release volume yields a combined Cs-137 and Sr-90 radionuclide content of 5.0 mCi.

3.1.12 Site CPP-24

Site CPP-24 is a contaminated soil site in the tank farm area resulting from the accidental dumping of a bucket in 1954. Approximately 1 gal of liquid radioactive waste with radiation levels of 400 mR/hr was spilled while work was being conducted in the vicinity of a tank riser at WM-180 (Figure 3-1) (WINCO 1993a). The spill covered a 3 × 6-ft area. The liquid would have contained mercuric nitrate, nitric acid, and radionuclides. The contamination from the spill was reportedly cleaned up (logbooks indicate that the spilled material was removed) and documented in a radioactivity incident report. Though the exact location of this spill is unknown, radiation surveys in the area revealed no radiation levels above background (WINCO 1993a; DOE-ID 1994).

This site was recommended in a Track 2 investigation as a No Further Action site because the source was documented as having been removed, and any residual contamination would be addressed during the OU 3-13 RI/FS (WINCO 1993a). Site CPP-24 is being reinvestigated, because consolidation of all tank farm soil and sites within CPP-96 subjects CPP-24 to OU 3-14 RI/FS activities.

3.1.13 Site CPP-30

Site CPP-30 is an area of radioactively contaminated soil near valve box B-9 and was discovered by maintenance personnel in 1975 (Figure 3-1). The contamination covered 400 ft^2 and produced radiation levels up to 1 R/hr. The area was contaminated during a one-time preventative maintenance activity in which residual decontamination solution from the floor of the valve box contaminated personnel clothing and equipment, which were brought to the surface and inadvertently placed on blotter paper that covered the ground surface.

The contamination spread to the soil either through handling or tears in the blotter paper. The contaminated soil was removed, placed in 55-gal drums, and disposed of at the RWMC (WINCO 1993a; DOE-ID 1994). Subsequent surface radiation surveys in the area performed in 1991, 1992, and 2001 have shown no radiation levels above background.

This site was recommended in a Track 2 investigation as a No Further Action site because the entire area has been excavated in the past and the contaminated soil was removed (WINCO 1993a). Site CPP-30 is being reinvestigated because consolidation of all tank farm soil and sites within CPP-96 subjects CPP-30 to OU 3-14 RI/FS activities.

3.1.14 Site CPP-96

As discussed in Section 1, site CPP-96 incorporates tank farm soil sites as defined in the OU 3-13 ROD: CPP-15, -20, -25, -26, -27, -28, -31, -32, -33, -58, -79, and -96, as well as CPP-16, -24, and -30, which were screened out for further action in the OU 3-13 RI/FS. In the OU 3-13 ROD, all tank farm soils and CERCLA sites were consolidated into CPP-96. This section discusses work performed within the boundary of CPP-96 that helped further characterize the tank farm soils not associated with individual release sites. The first section discusses the tank farm surface gamma survey and points out the number and distribution of boreholes installed within CPP-96. The following section summarizes excavation activities and presents an overall estimate for the amount of contamination existing in the backfill material.

3.1.14.1 Site CPP-96 Surface Gamma Survey and Boreholes. A screening-level uncalibrated surface gamma survey was conducted over the main portion of the tank farm in August 2001. Results of this survey are shown in Figure 3-41. Gamma radiation ranged from <5,000 to 20,000 counts per second. Results of this survey were inconclusive because the instrument was not calibrated. However, the survey

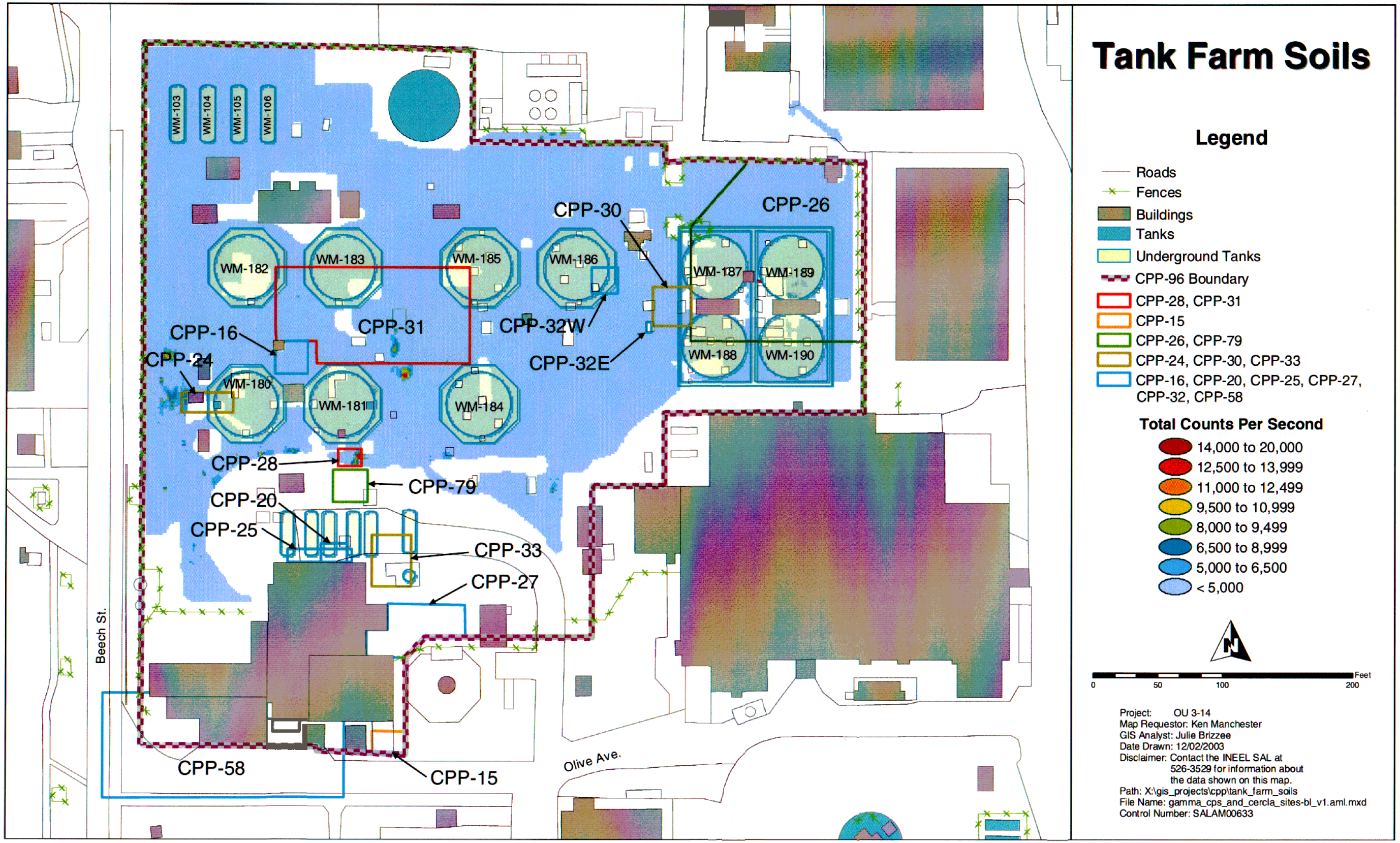

Figure 3-41. Tank farm map showing surface gamma survey results.

indicated that most of the readings were at or near what are assumed to be background levels. Small areas were found to have elevated gamma counts, but no quantification of these locations could be performed. Taking the highest readings for those areas and converting them resulted in approximate radiation levels between 2 and 3 mR/hr, making general assumptions for the instrument efficiency and detector area.

Due to the limitations of surface gamma survey, no follow-up survey will be performed under this RI/FS Work Plan. The gamma survey that was performed is not of much value for the following reasons: (1) The instrument cannot distinguish a surface area of contamination from a single hot particle on the surface or distinguish the depth below ground surface of detected contamination (surface surveys are used to detect the contamination at the surface). (2) If these surface areas were above the allowable radiation limit for worker protection, tank farm operations, which includes surveying the tank farm surface, would have followed procedures to have the area cleaned up to meet worker radiation limits. (3) The instrument used was not calibrated and therefore the cps have no direct meaning to mR/hr. Further reasons why a follow-up survey should not be performed include (1) the hot surface area identified within the boundary of CPP-28 is an area that will be sampled in the OU 3-14 investigation and (2) one of the identified surface hot spots is very close to probe hole A53-12, which is non-detect.

Figure 3-42 shows the CPP-96 site boundary and well, soil-probe, characterization-borehole, and cathodic-protection borehole locations from previous investigations and tank farm upgrades. The number of penetrations into the tank farm area is large and reasonably distributed across the CPP-96 boundary. If any additional major waste releases occurred at the tank farm, like CPP-31, penetrations would likely have encountered the contamination. The probes and boreholes, either directly or indirectly, helped to screen the tank farm soil for undiscovered release sites.

3.1.14.2 Tank Farm Excavations and Backfill. The construction and maintenance of the tank farm required numerous ground excavation campaigns. The first construction excavations began in 1951 with the installation of the first underground tank vaults for tanks WM-180 and WM-181. Subsequently, several more excavations were performed to install underground tank vaults, piping, and valve boxes and to perform maintenance (e.g., repair/replace piping, valves, and valve boxes). Most of the tank farm soil release sites have been involved with at least one of these excavations. A table format was used to collate the aspects of the major tank farm excavations for each release site (Table 3-13). The following section summarizes the major tank farm projects over the past 30 years that required extensive excavation. These excavations necessitated the use of shoring devices, which may have been left in place. Individual tank farm soil sites are addressed in Section 3.1.

3.1.14.2.1 Major Excavations—Excavations in the tank farm have been primarily for installing underground tank vaults, piping, and valve boxes and replacing pipes and valves. Excavated soil is sorted into soil piles reflective of the level of radionuclide contamination. Excavation activities involving maintenance and contaminated soil removal usually contained relatively low amounts of contamination. Typically, tank farm soil with contact radiation levels of < 3 to 5 mR/hr (attributed to Cs-137) was placed/returned in the bottom of the excavated area, and clean soil was placed over the top for shielding purposes (generally, the top 10 ft). Normally, contaminated soil at higher contact radiation levels (>5 mR/hr) was disposed of at the RWMC, if it met the RWMC disposal criteria. The particular backfill used at each excavation site was on a case-by-case basis and records documenting these activities were not always complete or readily available. The outcome of installing subsurface structures is extra soil volumes; these were sent to RWMC or placed in stockpiles or trenches for subsequent disposition.

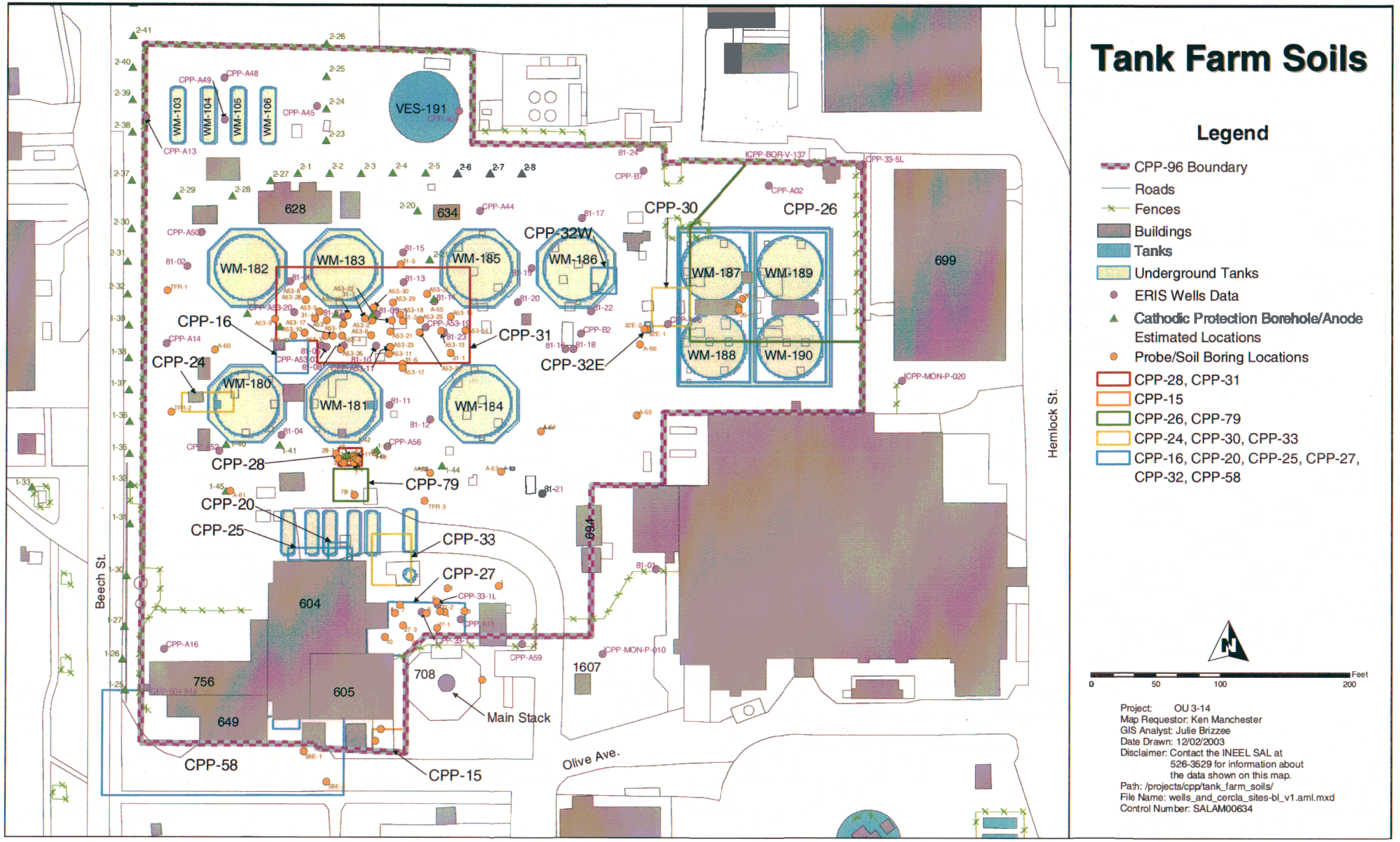

Figure 3-42. Tank farm map showing wells, cathodic-protection boreholes/anode estimated locations, and probe/soil-boring locations.

Table 3-13. Summary of excavation activity details for the individual tank farm release sites.

Site	Date Excavated	Approximate Volume Excavated	Approximate Area Excavated	Approximate Depth	Disposal Site	Backfill Source	Sampling	Comments
CPP-15	1974	Unknown	Unknown	Unknown	Unknown	Clean	No	Excavation reportedly filled with clean backfill. Contaminated soil from the spill was reported as removed and drummed.
	1983	200 yd^3	700 ft^2	10 ft bgs	Unknown	Unknown	No	Removal of contaminated soil thought to be complete.
	1995	Unknown	Unknown	6 ft bgs	Unknown	Unknown	Yes	Construction encountered contaminated backfill soil at 2 ft bgs. Samples confirmed contamination below 10 ft bgs not removed in 1983 or from different source, or backfill used in 1983 contained some contamination.
CPP-16	1977	Unknown	Unknown	7 ft bgs	Unknown	Unknown	Yes	Incomplete excavation records for 1977 valve box replacement construction activities.
CPP-20	Pre-1978	Unknown – contamination removed as spilled	Unknown	Unknown	Unknown	Unknown	No	The various spills reported to have been cleaned up as they occurred, but no documentation.
	1982	213 yd^3	205 ft^2	28 ft below CPP-604 north access door to top of CPP-604 tank vault	Unknown	The bottom 18 ft is believed to have been backfilled with <5-mR/hr soil and the top 10 ft backfilled with clean soil.	No	Spill site located over the tank vault on the north side of CPP-604. Excavation to install new lines on the north side of CPP-604 encompassed the entire CPP-20 soil site.
	1983-1984	Partial excavation, volume not documented	Not documented	E. portion to 28 ft bgs	Unknown	The bottom 18 ft is believed to have been backfilled with <5-mR/hr soil and the top 10 ft backfilled with clean soil.	No	A partial excavation of CPP-20 area was performed in the area during the installation of tanks WL-133 and WL-132 on east side of CPP-604.
CPP-24	1954	Unknown	Unknown	Unknown	Unknown	Unknown	No	Logbooks indicate spill was cleaned up.
CPP-25	1960	9 yd^3	Unknown	Unknown	Unknown	Unknown	No	No records to verify cleanup activities.
	1982	212 yd^3	205 ft^2	28 ft below CPP-604 north access door	Unknown	The bottom 18 ft is believed to have been backfilled with <5-mR/hr soil and the top 10 ft backfilled with clean soil.	No	Spill site located over the tank vault on the north side of CPP-604. Excavation to install new lines on the north side of CPP-604 encompassed the entire CPP-25 soil site.
CPP-26	1964	Partially removed	Unknown	Unknown	RWMC	Unknown	Yes	Surface soil was contaminated by aboveground steam release, area watered to reduce worker exposure, contamination infiltrated into ground.
CPP-27/33	1974	275 yd^3, partially removed E. of CPP-604	Unknown	Unknown	RWMC	Unknown	No	
	1983	Unknown, CPP-33 encompassed entirely, partially removed northern edge of CPP-27	Unknown	CPP-33 - 40 ft bgs (to install WL-132, WL-133); CPP-27 to 40 ft bgs	2,000 yd^3 (30 mR/hr) to RWMC 12,000 yd^3 to trenches NE area of INTEC	Backfilled with clean soil	No	Soils at CPP-27 and CPP-33 were both contaminated from the same release source.

Table 3-13. (continued).

Site	Date Excavated	Approximate Volume Excavated	Approximate Area Excavated	Approximate Depth	Disposal Site	Backfill Source	Sampling	Comments
CPP-28	1974	56 yd^3	189 ft^2	8 ft bgs	RWMC	Unknown	No	
	1993-1996	Portions excavated	Unknown	15 ft bgs	Stockpiles NW of tank farm near former trailer TR-35.	Unknown	No	
CPP-30	1975	Contamination removed	Unknown	Unknown	RWMC	Unknown	No	
CPP-31		No soil removal documented	Unknown	Unknown	Unknown	Unknown	No	
CPP-32W	1976	Unknown	Unknown	Unknown	Unknown	Unknown	No	Surface soil probably removed, standard procedure in 1976.
CPP-32E	1976	Unknown	Unknown	Unknown	Unknown	Unknown	No	Surface soil probably removed, standard procedure in 1976.
CPP-58	1954	Unknown	Unknown	Unknown	Unknown	Unknown	No	The 1954 release of PEW condensates occurred 6 to 8 ft bgs, between buildings CPP-601 and north side of CPP-604. The pipe was repaired during construction activities, but no documentation exists on excavation or cleanup.
	1976	No soil removed	Unknown	Unknown	Unknown	Unknown	Yes	Release of PEW condensate. due to a failure of the transfer line between PEW evaporator and the service waste diversion system in building CPP-751. Though the damaged line was repaired, the contaminated soil was reportedly left in place and covered with clean soil. Originally CPP-58E.
	2001	385 yd^3	TBD	TBD	ICDF pending	TBD	Yes	Moist brown material (nitric acid) at the south end of CPP-58E was removed without leading to a source for the contamination. At the lift station (Beech and Olive streets), low-level radionuclide contamination was discovered during excavation. Extent to be determined. Sample results not yet received.
CPP-79 Shallow	1993-1996	800 yd^3	675 ft^2	32 ft bgs	Stockpiles NW of tank farm near former trailer TR-35.	The 32-ft level and above probably backfilled with soil <3 mR/hr and the top covered with clean soil.	Yes	Reportedly most of the soil was removed from CPP-79 shallow during the 1992 HLWTFU project. The highly contaminated soil found at the bottom of CPP-79 Deep was returned to the bottom of the excavated area. As a standard practice, generally uncontaminated soil (<100 cpm above background) is placed in the top 10 ft of excavations to protect workers.

Table 3-13. (continued).

Site	Date Excavated	Approximate Volume Excavated	Approximate Area Excavated	Approximate Depth	Disposal Site	Backfill Source	Sampling	Comments
CPP-79 Deep	1993-1996	Not completely excavated	675 ft^2	Between 32 - 42 ft bgs	Unknown	Bottom of excavation (CPP-79 Deep) backfilled with soil >50 mR/hr followed by 3-mR/hr to 50-mR/hr soil, followed by <3-mR/hr soil and top covered with clean soil.	Yes	The top part of CPP-79 Deep was excavated (see CPP-79 Shallow). The highly contaminated soil > 50 mR/hr found at the lowest depth of CPP-79 Deep was returned to the bottom of the excavated area. The HLWTFU project generated about 1,500 yd^3 of contaminated soil in stockpiles north of former trailer TR-35. Approximately 70 yd^3 of that soil remains staged in the greater than 3 mR/hr but less than 50 mR/hr stockpile, and 1,430 yd^3 in the low-level contaminated stockpile (i.e., <3 mR/hr).[a]

a. Personal communication from Robert Moses, BBWI, to Cindy Klassy, MSE, March 15, 2004.

In some instances, excavated soils were encountered at higher radiation levels than initially anticipated. This soil was also segregated into soil piles. Soil that did not meet the RWMC disposal criteria was sometimes used as the bottom layer of backfill, followed by the less contaminated soil, and then a layer of clean soil. Soil remaining after excavation backfilling was sent to RWMC or stored in stock piles or trenches for future disposition.

In the early 1970s, several individual buried process waste valves began to fail (i.e., leaking, sticking open or closed). Repairing these valves required radiation shielding and excavation of soils previously contaminated by spills. In 1977, the tank farm waste transfer valve system was improved to reduce worker exposure to contaminated soil and to minimize the need for future excavation. This included excavation to replace older valves in existing valve boxes, reroute valve box piping, consolidate valves within new valve boxes, and connect tank vault sumps to a centrally located PEW line.

During 1982 and 1983, the Fuel Processing Facility Upgrade Project was undertaken to construct a concrete vault to house waste tanks WL-132 and WL-133 east of the PEW system (see Figure 2-5). Excavation was performed to bedrock (approximately 40 to 45 ft) and encompassed site CPP-33 (see Figures 3-27, 3-28, and 3-29) and the northern and eastern edges of CPP-27. In this same time frame, a separate project was underway to replace the process lines from CPP-601 to CPP-604. The excavation went to the top of the CPP-604 tank vault and encompassed sites CPP-20 and CPP-25.

In 1992, the HLWTFU project began and a significant portion of the tank farm was excavated. Old valve box valves were replaced with new valves capable of being repaired remotely using extension tools, thus reducing worker radiation exposure and the need to excavate. The carbon-steel pressure-relief discharge header connecting each tank farm tank to the exhaust stack was replaced with a new stainless-steel pressure-relief discharge line. In addition, remaining pipelines with inadequate secondary containment were replaced (capped and abandoned in place), and other unnecessary piping was eliminated as needed.

3.1.14.2.2 Shoring—During excavation activities, various types of shoring devices, such as wooden planking held in place with steel beams or a conjoining concrete spray, maintained the initial grade of adjacent surfaces and prevented wall failure. Once work was completed, most shoring devices were abandoned and buried in place, as the excavated areas were backfilled to grade level. The use of this technique was discontinued during the 1992 HLWTFU project. As illustrated in Figure 3-43, potentially abandoned shoring devices could be encountered during subsurface investigations within the following tank farm areas:

1. North and east of WM-180 and WM-181 because of WM-182, WM-183, and WM-184 tank construction

2. North of WM-182 and WM-183 because of WM-103 through WM-106 tank construction

3. East of WM-186 because of WM-187 and WM-188 tank construction

4. Between WM-184 and CPP-604 because of WL-132 and WL-133 tank construction (located inside CPP-604)

5. North of the CPP-708 stack because of stack reconstruction and enlargement.